

ASSIGNMENT 2

Textbook assignment: Chapter 2, "Radio Wave Propagation," pages 2-1 through 2-47.

- 2-1. The induction field is made up of which of the following fields?
1. E field only
 2. H field only
 3. Both E and H fields
- 2-2. After the radiation field leaves an antenna, what is the relationship between the E and H fields with respect to (a) phase and (b) physical displacement in space?
1. (a) In phase (b) 90 degrees
 2. (a) Out of phase (b) 90 degrees
 3. (a) In phase (b) 180 degrees
 4. (a) Out of phase (b) 180 degrees
- 2-3. What is the first harmonic of a radio wave that has a fundamental frequency of 2,000 kHz?
1. 6,000 kHz
 2. 2,000 kHz
 3. 3,000 kHz
 4. 4,000 kHz
- 2-4. In a radio wave with a fundamental frequency of 1.5 kHz, which of the following frequencies is NOT a harmonic?
1. 6,000 kHz
 2. 5,000 kHz
 3. 3,000 kHz
 4. 4,000 kHz
- 2-5. A radio wave with a frequency of 32 kHz is part of which of the following frequency bands?
1. The lf band
 2. The mf band
 3. The hf band
 4. The vhf band
- 2-6. A frequency of 3.5 GHz falls into what rf band?
1. High
 2. Very high
 3. Super high
 4. Extremely high
- 2-7. A radio wavelength expressed as 250 meters may also be expressed as how many feet?
1. 410
 2. 820
 3. 1,230
 4. 1,640
- 2-8. An increase in the frequency of a radio wave will have what effect, if any, on the velocity of the radio wave?
1. Increase
 2. Decrease
 3. None
- 2-9. An increase in frequency of a radio wave will have what effect, if any, on the wavelength of the radio wave?
1. Increase
 2. Decrease
 3. None
- 2-10. What is the frequency, in kiloHertz, of a radio wave that is 40 meters long?
1. 75
 2. 750
 3. 7,500
 4. 75,000

2-11. What is the approximate wavelength, in feet, of a radio wave with a frequency of 5,000 kHz?

1. 197 feet
2. 1,970 feet
3. 19,700 feet
4. 197,000 feet

2-12. The polarity of a radio wave is determined by the orientation of (a) what moving field with respect to (b) what reference?

1. (a) Electric (b) earth
2. (a) Electric (b) antenna
3. (a) Magnetic (b) antenna
4. (a) Magnetic (b) earth

2-13. Energy radiated from an antenna is considered horizontally polarized under which of the following conditions?

1. If the wavefront is in the horizontal plane
2. If the magnetic field is in the horizontal plane
3. If the electric field is in the horizontal plane
4. If the induction field is in the horizontal plane

2-14. The ability of a reflecting surface to reflect a specific radio wave depends on which of the following factors?

1. Striking angle
2. Wavelength of the wave
3. Size of the reflecting area
4. All of the above

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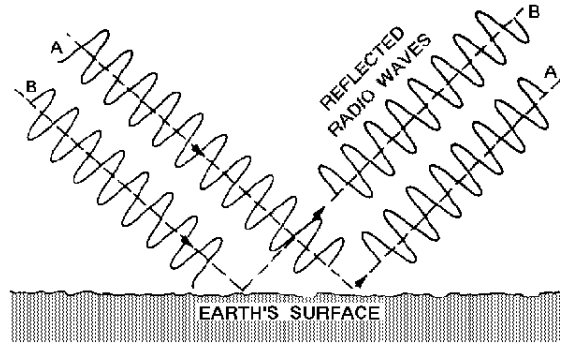


Figure 2-A.—Reflected radio waves.

IN ANSWERING QUESTION 2-15, REFER TO FIGURE 2-A.

2-15. If the two reflected radio waves shown in the figure are received at the same instant at the receiving site, what will be the effect, if any, on signal quality?

1. A stronger signal will be produced
2. A weak or fading signal will be produced
3. The signal will be completely canceled out
4. None

2-16. The bending of a radio wave because of a change in its velocity through a medium is known as

1. refraction
2. reflection
3. deflection
4. diffraction

2-17. Radio communications can be diffracted to exceptionally long distances through the use of (a) what frequency band at (b) what relative power level?

1. (a) Very low frequency (b) Low power
2. (a) Very high frequency (b) Low power
3. (a) Very low frequency (b) High power
4. (a) Very high frequency (b) High power

2-18. Electrically charged particles that affect the propagation of radio waves are found in what atmospheric layer?

1. Troposphere
2. Ionosphere
3. Chronosphere
4. Stratosphere

2-19. Most weather phenomena take place in which of the following region of the atmosphere?

1. Troposphere
2. Ionosphere
3. Chronosphere
4. Stratosphere

2-20. Radio wave propagation has the least effect because of its constancy on which of the following atmospheric layers?

1. Troposphere
2. Ionosphere
3. Chronosphere
4. Stratosphere

2-21. Long range, surface-wave communications are best achieved when the signal is transmitted over seawater with (a) what polarization at (b) what relative frequency?

1. (a) Vertical (b) Low
2. (a) Vertical (b) High
3. (a) Horizontal (b) High
4. (a) Horizontal (b) Low

2-22. The Navy's long-range vlf broadcasts are possible because of the advantages of which of the following types of propagation?

1. Diffraction
2. Ionospheric refraction
3. Repeated reflection and refraction
4. Both 2 and 3 above

2-23. A space wave (a) is primarily a result of refraction in what atmospheric layer and (b) extends approximately what distance beyond the horizon?

1. (a) Ionosphere (b) One-tenth farther
2. (a) Ionosphere (b) One-third farther
3. (a) Troposphere (b) One-third farther
4. (a) Troposphere (b) One-tenth farther

2-24. The signal of a space wave is sometimes significantly reduced at the receiving site because of which of the following interactions?

1. Space-wave refraction
2. Space-wave reflections
3. Ground-wave diffraction
4. Ground-wave reflections

2-25. For long-range communications in the hf band, which of the following types of waves is most satisfactory?

1. Sky wave
2. Space wave
3. Surface wave
4. Reflected ground wave

2-26. Ionization in the atmosphere is produced chiefly by which of the following types of radiation?

1. Alpha radiation
2. Cosmic radiation
3. Infrared radiation
4. Ultraviolet radiation

2-27. Ultraviolet waves of higher frequencies produce ionized layers at what relative altitude(s)?

1. Lower
2. Higher
3. Both 1 and 2 above

- 2-28. The density of ionized layers is normally greatest during which of the following periods?
1. At night
 2. Before sunrise
 3. Between early morning and late afternoon
 4. Between afternoon and sunset
- 2-29. Compared to the other ionospheric layers at higher altitudes, the ionization density of the D layer is
1. about the same
 2. relatively low
 3. relatively high
- 2-30. What two layers in the ionosphere recombine and largely disappear at night?
1. D and F
 2. D and E
 3. E and F2
 4. F1 and F2
- 2-31. For hf-radio communications covering long distances, what is the most important layer of the ionosphere?
1. C
 2. D
 3. E
 4. F
- 2-32. Refraction of a sky wave in the ionosphere is influenced by which of the following factors?
1. Ionospheric density
 2. Frequency of the wave
 3. Angle of incidence of the wave
 4. All of the above
- 2-33. A 10-MHz wave entering the ionosphere at an angle greater than its critical angle will pass through the ionosphere and be lost in space unless which of the following actions is taken?
1. The ground wave is canceled
 2. The frequency of the wave is increased
 3. The frequency of the wave is decreased
 4. The ground wave is reinforced
- 2-34. The distance between the transmitter and the nearest point at which refracted waves return to earth is referred to as the
1. skip distance
 2. return distance
 3. reception distance
 4. ground-wave distance
- 2-35. When ground-wave coverage is LESS than the distance between the transmitter and the nearest point at which the refracted waves return to earth, which of the following reception possibilities should you expect?
1. No sky-wave
 2. Weak ground wave
 3. A zone of silence
 4. Strong ground wave
- 2-36. The greatest amount of absorption takes place in the ionosphere under which of the following conditions?
1. When sky wave intensity is the greatest
 2. When collision of particles is least
 3. When the density of the ionized layer is the greatest
 4. When precipitation is greatest
- 2-37. Which of the following layers provide the greatest amount of absorption to the ionospheric wave?
1. D and E
 2. D and F1
 3. E and F1
 4. F1 and F2

- 2-38. If the signal strength of an incoming signal is reduced for a prolonged period, what type of fading is most likely involved?
1. Selective
 2. Multipath
 3. Absorption
 4. Polarization
- 2-39. Radio waves that arrive at a receiving site along different paths can cause signal fading if these waves have different
1. velocities
 2. amplitudes
 3. phase relationships
 4. modulation percentages
- 2-40. The technique of reducing multipath fading by using several receiving antennas at different locations is known as what type of diversity?
1. Space
 2. Receiver
 3. Frequency
 4. Modulation
- 2-41. The amount of rf energy lost because of ground reflections depends on which of the following factors?
1. Angle of incidence
 2. Ground irregularities
 3. Frequency of the wave
 4. Each of the above
- 2-42. Receiving sites located near industrial areas can expect to have exceptionally large losses in signal quality as a result of which of the following propagation situations?
1. Absorption
 2. Multihop refraction
 3. Natural interference
 4. Man-made interference
- 2-43. Which of the following ionospheric variation causes densities to vary with the axial rotation of the sun?
1. Daily variation
 2. Seasonal variation
 3. 27-day sunspot cycle
 4. 11-year sunspot cycle
- 2-44. Which of the following ionospheric variation causes densities to vary with the position of the earth in its orbit around the sun?
1. Daily variation
 2. Seasonal variation
 3. 27-day sunspot cycle
 4. 11-year sunspot cycle
- 2-45. Which of the following ionospheric variation causes densities to vary with the time of the day?
1. Daily variation
 2. Seasonal variation
 3. 27-day sunspot cycle
 4. 11-year sunspot cycle
- 2-46. What relative range of operating frequencies is required during periods of maximum sunspot activity?
1. Lower
 2. Medium
 3. Higher
- 2-47. What factor significantly affects the frequency of occurrence of the sporadic-E layer?
1. Seasons
 2. Latitude
 3. Weather conditions
 4. Ionospheric storms

- 2-48. What effect can the sporadic-E layer have on the propagation of sky waves?
1. Causes multipath interference
 2. Permits long distance communications at unusually high frequencies
 3. Permits short-distance communications in the normal skip zone
 4. Each of the above
- 2-49. A sudden and intense burst of ultraviolet light is especially disruptive to communications in which of the following frequency bands?
1. Hf
 2. Mf
 3. Lf
 4. Vlf
- 2-50. The density of what ionosphere layer increases because of a violent eruption on the surface of the sun?
1. D
 2. E
 3. F1
 4. F2
- 2-51. Which irregular variation in ionospheric conditions can cause a waiting period of several days before communications return to normal?
1. Sporadic E
 2. Ionospheric storms
 3. Sudden ionospheric disturbance
 4. Each of the above
- 2-52. For a radio wave entering the atmosphere of the earth at a given angle, the highest frequency at which refraction will occur is known by which of the following terms?
1. Usable frequency
 2. Refraction frequency
 3. Maximum usable frequency
 4. Optimum working frequency
- 2-53. The most consistent communications can be expected at which of the following frequencies?
1. Critical frequency
 2. Maximum usable frequency
 3. Maximum working frequency
 4. Optimum working frequency
- 2-54. If the optimum working frequency for a communications link is 4,250 kHz, what is the approximate maximum usable frequency?
1. 4,500 kHz
 2. 5,000 kHz
 3. 5,500 kHz
 4. 6,000 kHz
- 2-55. In determining the success of radio transmission, which of the following factors is the LEAST predictable?
1. Antenna capabilities
 2. Weather conditions along the path of communication
 3. Density of ionized layers
 4. Presence of ionized layers
- 2-56. At frequencies above 100 MHz, the greatest attenuation of rf energy from raindrops is caused by which of the following factors?
1. Ducting
 2. Heat loss
 3. Scattering
 4. Absorption
- 2-57. Under certain conditions, such as ducting, line-of-sight radio waves often propagate for distances far beyond their normal ranges because of which of the following factors?
1. Low cloud masses
 2. Ionospheric storms
 3. Temperature inversions
 4. Frequency fluctuations

2-58. When ducting is present in the atmosphere, multihop refraction of line-of-sight transmission can occur because of which of the following factors?

1. Operating frequency of the transmitter
2. Height of the transmitting antenna
3. Angle of incidence of the radio wave
4. Each of the above

2-59. A propagation technique used to extend uhf transmission range beyond the horizon uses which of the following propagation characteristics?

1. Ground reflection
2. Ionospheric scatter
3. Tropospheric scatter
4. Atmospheric refraction

2-60. Communications by tropospheric scatter can be affected by which of the following conditions?

1. Sunspot activity
2. Atmospheric conditions
3. Ionospheric disturbances
4. All of the above

2-61. What effect, if any, does the radiation angle of a transmitting antenna have on the reception of communications by tropospheric scatter?

1. The lower the angle, the weaker the signal
2. The lower the angle, the stronger the signal
3. The lower the angle, the more susceptible the signal is to distortion
4. None

2-62. Which of the following descriptions of tropospheric scatter signal reception is NOT true?

1. Receiver signal strength decreases as the turbulence height is increased
2. The level of reception depends on the number of turbulences causing scatter
3. The energy received is the portion of the wave reradiated by the turbulence
4. Increased communications distance enables more turbulence to act on the signal, thereby raising the received signal level

2-63. The tropospheric scatter signal is often characterized by very rapid fading caused by which of the following factors?

1. Extreme path lengths
2. Multipath propagation
3. Turbulence in the atmosphere
4. Angle of the transmitted beam

2-64. For which of the following communications situations would turbulence in the troposphere scatter transmission?

1. 10 MHz, range 200 miles
2. 30 MHz, range 800 miles
3. 50 MHz, range 600 miles
4. 100 MHz, range 400 miles